

Santee Cooper Lakes

DRAFT

26. Lake Marion

(Calhoun, Clarendon, and Sumter Counties)

1. Problem plant species

Hydrilla	Alligatorweed	Fanwort
Water willow	Water hyacinth	Slender naiad
Water primrose	Giant Cutgrass	Coontail
Filamentous algae (Lyngbya)		Slender Pondweed
Crested floating Heart		Fragrant waterlily

2. Management objectives

- a. Foster a diverse aquatic plant community through selective treatment of nuisance aquatic vegetation (to avoid adverse impacts to existing non-invasive plant species) and the introduction of desirable native plant species.
- b. Manage hydrilla growth throughout the main lake and subimpoundments to minimize its spread within the lake, help prevent its spread to adjacent public waters, and minimize adverse impacts to electric power generation, agricultural irrigation withdrawals, and public use and access.
- c. Reduce water hyacinth populations throughout the lake to enhance boating, fishing, hunting, and public access.
- d. Reduce giant cutgrass populations throughout the lake, especially in the Hickory Top Wildlife Management Area and upper lake near Lowfalls landing, to enhance wildlife habitat and hunting opportunities.
- e. Reduce fragrant waterlily and alligatorweed populations throughout the Santee Cooper Wildlife Management Area to enhance wildlife habitat and hunting opportunities.
- f. Reduce other nuisance aquatic vegetation in priority use areas, such as electric power generation facilities, public and commercial access sites (boat ramps, piers, swimming areas, marinas) and residential shoreline areas in the main lake and subimpoundments.

3. Selected control method

Problem Species	Control Agents
Hydrilla	Aquathol K, Sonar, chelated copper*, Triploid grass carp
Lyngbya	chelated copper*
Water hyacinth	Reward, Renovate 3, Clearcast

Fanwort, coontail, slender naiad,
slender pondweed

Aquathol K, Sonar, Reward

Water primrose, alligatorweed,
giant cutgrass

Glyphosate, Habitat, Renovate 3, Clearcast-

* May be toxic to fish at recommended treatment rates; however, precautions will be implemented to minimize the risk of fish kills.

4. Area to which control is to be applied

Water hyacinth - Approximately 750 acres throughout lake but mostly in the upper lake area above I-95 bridge.

Hydrilla - Approximately 400 acres in priority areas such as electric power generation facilities, public and commercial access sites (boat ramps, piers, swimming areas, marinas) and residential shoreline areas in the main lake and sub-impoundments. If conditions warrant, release triploid grass carp in close proximity to areas of the lake with the greatest hydrilla growth and use herbicide applications to provide immediate short-term control of localized growth in those areas.

Giant Cutgrass - Approximately 50 acres along shoreline areas throughout lake system.

Crested Floating Heart - Approximately 200 acres in priority areas such as public and commercial access sites (boat ramps, piers, swimming areas, marinas, and residential shoreline areas in the main lake).

Other target species - Approximately 100 acres in priority areas such as electric power generation facilities, public and commercial access sites (boat ramps, piers, swimming areas, marinas) and residential shoreline areas in the main lake and sub-impoundments.

Sub-Impoundments -

a. Dean's Swamp Impoundment, Potato Creek Impoundment, Church Branch Impoundment, Taw Caw Impoundment

The general management strategy is to transition from hydrilla dominant plant communities to ones dominated by native plant species, which are beneficial to wildlife, by use of aquatic herbicides. Specific control methods for the sub-impoundments will be determined cooperatively between Santee Cooper and SCDNR staffs which are consistent with both groups' interests for control of invasive plant species such as hydrilla while promoting vegetation beneficial to wildlife and waterfowl through other habitat enhancement projects.

5. Rate of control agents to be applied

Aquathol K - 6 to 10 gallons per acre (dependent on water depth)

Reward - 0.5 gallon per acre for floating plants; two gallons per acre for submersed plants

Renovate 3 - 0.5 to 0.75 gallons per acre for emergent species, per label for submersed plants.

Habitat - 1 to 6 pints per acre

Sonar AS - 0.075 to 0.15 ppm

Chelated Copper- up to 1 ppm

Glyphosate - up to 1 gallon per acre.

Sonar Q, Sonar PR - up to 40 ppb(approx 10 pounds/acre)

Clearcast - 1 to 4 pints per acre

Triploid grass carp –The Aquatic Plant Management Council is committed to maintenance stocking of triploid grass carp in the Santee Cooper Lakes to provide long-term control of hydrilla. Drought conditions during the past year resulted in a decrease in lake levels to near historic lows. The long-term impacts of the low water levels on the increasing hydrilla growths observed early in the year are as yet undetermined. These impacts may range from a degree of control to exposed beds of vegetation to rapidly expanded growth due to shallower and clearer water. As a result of these unknowns, no grass carp will be stocked until a determination of impacts can be made. Hydrilla populations will be carefully monitored and in the event that survey results and regrowth warrant, the Aquatic Plant Management Council will resume maintenance stocking of grass carp at that time. A maintenance stocking plan developed in 1999 provided for the stocking of grass carp at a rate that maintains a low level population to control hydrilla yet maintain native plant species. The plan was initiated in 2007 when it was apparent that aquatic vegetation was increasing in the lakes. Surveys in 2007(pre-drought) continue to indicate a substantial increase in aquatic plants and the regrowth of hydrilla in some areas. The plan is intended to maintain the population of triploid grass carp at the same level that was present in 2006.

6. Method of application of control agents

Aquathol K, chelated copper, Sonar - subsurface application by airboat or surface application by helicopter.

Reward - (water hyacinths) spray on surface of foliage using handgun from airboat or by helicopter with appropriate surfactant;(submersed plants) subsurface application.

Renovate 3, Glyphosate, Habitat, Clearcast - spray on surface of foliage with appropriate surfactant.

Triploid grass carp – Using standard techniques to minimize loss, stock sterile grass carp in areas of the lake with the greatest hydrilla growth.

7. Timing and sequence of control application

Herbicide applications - All herbicide applications to be applied when plants are actively growing. Water hyacinth treatments should be initiated in early spring when plant growth begins and continued regularly during the year as needed.

Triploid grass carp - If conditions warrant, triploid grass carp to be released as soon as possible.

8. Other control application specifications

Treatment of the control area is to be conducted in a manner that will not significantly degrade water quality. This may require that only a portion of the control area be treated at any one time.

Water hyacinth treatments should be considered a high priority to minimize spread to other areas of the lake system. Treatments should be conducted wherever the plants occur and access by boat is feasible. Frequent treatments in this area will be necessary to meet management objectives.

If available, all sterile grass carp will be a minimum of 12 inches in length. Sterile grass carp shipments for Lake Marion will be certified by the SCDNR for sterility and checked for size and condition prior to stocking in the lake.

9. Entity to apply control agents

Herbicide application - S.C. Public Service Authority and/or commercial applicator.

Triploid Grass Carp - S.C. Public Service Authority and/or a commercial supplier with supervision by the SCDNR.

10. Estimated cost of control operations

\$250,000

Note: The budgeted amount is based on aquatic plant coverage and treatment needs from previous years. Actual expenditures will depend on the extent of noxious aquatic plant growth in 2008.

11. Potential sources of funding

S.C. Public Service Authority 50%

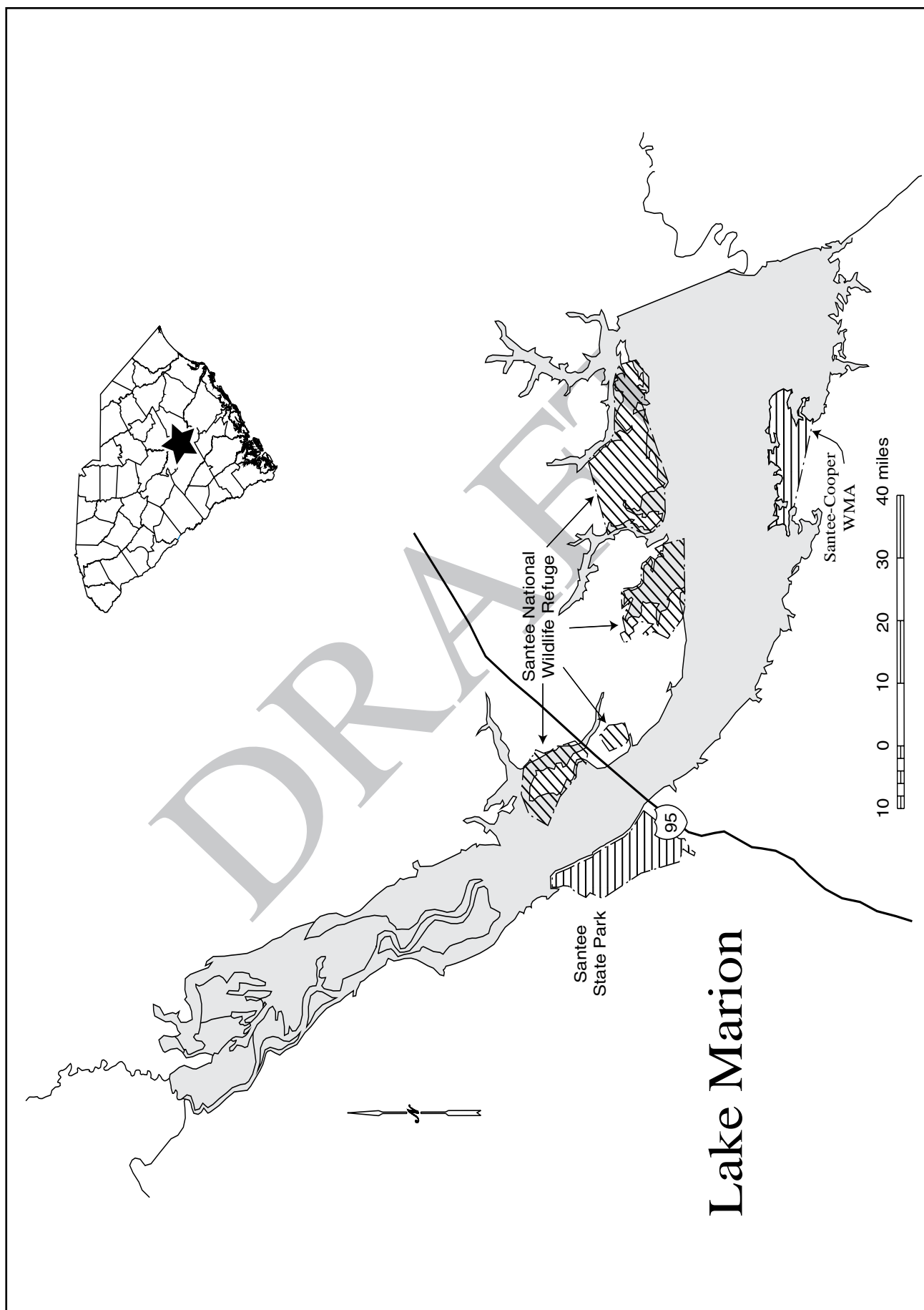
U.S. Army Corps of Engineers 0%

S. C. Department of Natural Resources 50%

(Percentage of match subject to change based on availability of Federal and State funding.)

12. Long term management strategy

- a. Support the management goals established by the DNR and Santee Cooper (Appendix E) which attempts to achieve a diverse assemblage of native aquatic vegetation in 10% of the total surface area of the lake and to effectively control non-native invasive species.
- b. Manage the distribution and abundance of nuisance aquatic plant populations at levels that minimize adverse impacts to water use activities and the environment through the use of federal and state approved control methods.
- c. A long-term integrated management strategy has been implemented to control hydrilla. Triploid grass carp have been stocked to control hydrilla growth lake-wide and approved aquatic herbicides are used to control localized growth in priority use areas. Future plans include annual maintenance stocking of grass carp to maintain the population at a level that is sufficient to maintain control of hydrilla but to minimize impacts on desirable native plant populations.
- d. Maintain or enhance native aquatic plant populations at levels beneficial to water use, water quality, and fish and wildlife populations through selective control of nuisance plant populations where feasible, introduction of native plant species where appropriate, and public education of the benefits of aquatic vegetation in general.
- e. Seek to prevent further introduction and distribution of problem species through public education, posting signs at boat ramps, regular surveys of the water body, and enforcement of existing laws and regulations.
- f. Periodically revise the management strategy and specific control sites as new environmental data, management agents and techniques, and public use patterns become available.



27. Lake Moultrie

(Berkeley County)

1. Problem plant species

Hydrilla	Slender naiad	Watermilfoil
Water willow	Water primrose	Alligatorweed
Fanwort	Water hyacinth	Giant Cutgrass

2. Management objectives

- Foster a diverse aquatic plant community through selective treatment of nuisance aquatic vegetation (to avoid adverse impacts to existing non-invasive plant species) and the introduction of desirable native plant species.
- Manage hydrilla growth throughout the main lake and subimpoundments to minimize its spread within the lake, help prevent its spread to adjacent public waters, and minimize adverse impacts to electric power generation, agricultural irrigation withdrawals, and public use and access.
- Reduce water hyacinth populations throughout the lake to enhance boating, fishing, hunting, and public access.
- Reduce giant cutgrass populations throughout the lake to enhance wildlife habitat and hunting opportunities.
- Reduce other nuisance aquatic vegetation in priority use areas, such as electric power generation facilities, public and commercial access sites (boat ramps, piers, swimming areas, marinas) and residential shoreline areas.

3. Selected control method

Problem Species

Control Agents

Hydrilla	Aquathol K, Sonar, Triploid grass carp** Chelated Copper
Water hyacinth	Reward, Renovate 3
Fanwort, slender naiad, watermilfoil	Aquathol K, Sonar, Reward, Renovate 3
Water primrose, alligatorweed, giant cutgrass	Glyphosate, Habitat, Renovate 3

*** May be toxic to fish at recommended treatment rates; however, precautions will be implemented to minimize the risk of fish kills.**

4. Area to which control is to be applied

Hydrilla, fanwort, watermilfoil - Approximately 80 acres in priority areas such as electric power generation facilities, public and commercial access sites (boat ramps, piers, swimming areas, marinas) and residential shoreline areas and sub-impoundments. If conditions warrant, release triploid grass carp in close proximity to areas of the lake with the greatest hydrilla growth and use herbicide applications to provide immediate short-term control of localized growth in those areas.

Giant cutgrass, water primrose, alligatorweed - Approximately 90 acres along shoreline areas throughout the lake.

Sub -Impoundments -

a. Stoney Bay Impoundment

The general management strategy is to transition from hydrilla dominant plant communities to ones dominated by native plant species, which are beneficial to wildlife, by use of aquatic herbicides. Specific control methods for the sub-impoundments will be determined cooperatively between Santee Cooper and SCD-NR staffs which are consistent with both groups' interests for control of invasive plant species such as hydrilla while promoting vegetation beneficial to wildlife and waterfowl through other habitat enhancement projects.

5. Rate of control agents to be applied

Aquathol K - 6 to 10 gallons per acre (dependent on water depth)

Reward - 0.5 gallon per acre for floating plants; two gallons per acre for submersed plants

Renovate 3 - 0.5 to 0.75 gallons per acre for emergent species, per label for submersed plants.

Habitat - 1 to 6 pints per acre

Sonar AS - 0.075 to 0.15 ppm in treatment area

Chelated copper - up to 1 ppm

Glyphosate- up to 1 gallon per acre.

Sonar Q, Sonar PR - up to 40 ppb(approx 10 pounds/acre)

Clearcast - 1 to 4 pints per acre

Other approved aquatic herbicides - as per label instructions.

Triploid grass carp –The Aquatic Plant Management Council is committed to maintenance stocking of triploid grass carp in the Santee Cooper Lakes to provide long-term control of hydrilla. Drought conditions during the past year resulted in a decrease in lake levels to near historic lows. The long-term impacts of the low water levels on the increasing hydrilla growths observed early in the year are as yet undetermined. These impacts may range from a degree of control to exposed beds of vegetation to rapidly expanded growth due to shallower and clearer water. As a result of these unknowns, no grass carp will be stocked until a determination of impacts can be made. Hydrilla populations will be carefully monitored and in the event that survey results and regrowth warrant, the Aquatic Plant Manage-

ment Council will resume maintenance stocking of grass carp at that time. A maintenance stocking plan developed in 1999 provided for the stocking of grass carp at a rate that maintains a low level population to control hydrilla yet maintain native plant species. The plan was initiated in 2007 when it was apparent that aquatic vegetation was increasing in the lakes. Surveys in 2007(pre-drought) continue to indicate a substantial increase in aquatic plants and the regrowth of hydrilla in some areas. The plan is intended to maintain the population of triploid grass carp at the same level that was present in 2006.

6. Method of application of control agents

Aquathol K, chelated copper, Sonar, - subsurface application by airboat or surface application by helicopter.

Reward - (water hyacinths) spray on surface of foliage using handgun from airboat or by helicopter with appropriate surfactant;(submersed plants) subsurface application .

Renovate 3, Glyphosate, Habitat, clearcast - spray on surface of foliage with appropriate surfactant.

Triploid grass carp – Using standard techniques to minimize loss, stock sterile grass carp in areas of the lake with the greatest hydrilla growth.

7. Timing and sequence of control application

All herbicides to be applied when plants are actively growing.

If needed, aerial treatment of hydrilla adjacent to the Rediversion Canal entrance should be performed as early as possible to prevent excessive plant growth and avoid impacts to the St. Stephen Hydropower Plant.

Triploid grass carp – If conditions warrant, triploid grass carp to be released as soon as possible.

8. Other control application specifications

Herbicide used only upon approval by the S.C. Department of Health and Environmental Control.

Treatment of the control area is to be conducted in a manner that will not significantly degrade water quality. This may require that only a portion of the control area be treated at any one time.

Treatment of lake, especially near the Rediversion Canal, should be coordinated with hydropower production to avoid excessive flows and maximize herbicide contact time.

If available, all sterile grass carp will be a minimum of 12 inches in length. Sterile grass carp shipments for Lake Moultrie will be certified by the SCDNR for sterility and checked for size and condition prior to stocking in the lake.

9. Entity to apply control agent
- Herbicide application - S.C. Public Service Authority and/or commercial applicator.
- Triploid Grass Carp - S.C. Public Service Authority and/or a commercial supplier with supervision by the SCDNR.
10. Estimated cost of control operations
- \$35,000
- Note:** The budgeted amount is based on aquatic plant coverage and treatment needs from previous years. Actual expenditures will depend on the extent of noxious aquatic plant growth in 2008.
11. Potential sources of funding
- S.C. Public Service Authority 50%
- U.S. Army Corps of Engineers 0%
- S. C. Department of Natural Resources 50%
- (Percentage of match subject to change based on availability of Federal and State funding.)*
12. Long term management strategy
- a. Support the management goals established by the DNR and Santee Cooper (Appendix E) which attempts to achieve a diverse assemblage of native aquatic vegetation in 10% of the total surface area of the lake and to effectively control non-native invasive species.
 - b. Manage the distribution and abundance of nuisance aquatic plant populations at levels that minimize adverse impacts to water use activities and the environment through the use of federal and state approved control methods.
 - c. A long-term integrated management strategy has been implemented to control hydrilla. Triploid grass carp have been stocked to control hydrilla growth lake-wide and approved aquatic herbicides are used to control localized growth in priority use areas. Future plans include annual maintenance stocking of grass carp to maintain the population at a level that is sufficient to maintain control of hydrilla but to minimize impacts on desirable native plant populations.
 - d. Maintain or enhance native aquatic plant populations at levels beneficial to water use, water quality, and fish and wildlife populations through selective control of nuisance plant populations where feasible, introduction of native plant species where appropriate, and public education of the benefits of aquatic vegetation in general.

- e. Seek to prevent further introduction and distribution of problem species through public education, posting signs at boat ramps, regular surveys of the water body, and enforcement of existing laws and regulations.
- f. Periodically revise the management strategy and specific control sites as new environmental data, management agents and techniques, and public use patterns become available.

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